PART 531—PASSENGER AUTOMOBILE AVERAGE FUEL ECONOMY STANDARDS

AUTHORITY: 49 U.S.C. 32902, delegation of authority at 49 CFR 1.50.

SOURCE: 42 FR 33552, June 30, 1977, unless otherwise noted.

§ 531.1 Scope.

This part establishes average fuel economy standards pursuant to section 502 (a) and (c) of the Motor Vehicle Information and Cost Savings Act, as amended, for passenger automobiles.

[43 FR 28204, June 29, 1978]

§ 531.2 Purpose.

The purpose of this part is to increase the fuel economy of passenger automobiles by establishing minimum levels of average fuel economy for those vehicles.

§ 531.3 Applicability.

This part applies to manufacturers of passenger automobiles.

§ 531.4 Definitions.

(a) *Statutory terms.* (1) The terms *average fuel economy*, *manufacture*, *manufacturer*, and *model year* are used as defined in section 501 of the Act.

(2) The terms *automobile* and *passenger automobile* are used as defined in section 501 of the Act and in accordance with the determination in part 523 of this chapter.

(b) *Other terms.* As used in this part, unless otherwise required by the context—

(1) *Act* means the Motor Vehicle Information and Cost Savings Act, as amended by Pub. L. 94–163.

§ 531.5 Fuel economy standards.

(a) Except as provided in paragraph (f) of this section, each manufacturer of passenger automobiles shall comply with the fleet average fuel economy standards in Table I, expressed in miles per gallon, in the model year specified as applicable:

TABLE I

Model year	Standard
1978...	18.0
1979...	19.0
1980...	20.0
1981...	22.0
1982...	24.0
1983...	26.0
1984...	27.0
1985...	27.5
1986...	26.0
1987...	26.0
1988...	26.0
1989...	26.5
1990-2010......................................	27.5

(b) For model year 2011, a manufacturer's passenger automobile fleet shall comply with the fleet average fuel economy level calculated for that model year according to Figure 1 and the appropriate values in Table II.

Figure 1:

$$Required\_Fuel\_Economy\_Level = \frac{N}{\sum_i \frac{N_i}{T_i}}$$

Where:

N is the total number (sum) of passenger automobiles produced by a manufacturer;

N_i is the number (sum) of the *ith* passenger automobile model produced by the manufacturer; and

T_i is the fuel economy target of the *ith* model passenger automobile, which is determined according to the following formula, rounded to the nearest hundredth:

$$T = \frac{1}{\frac{1}{a} + \left(\frac{1}{b} - \frac{1}{a}\right)\frac{e^{(x-c)d}}{1 + e^{(x-c)d}}}$$

Where:

Parameters a, b, c, and d are defined in Table II;

$e = 2.718$; and

x = footprint (in square feet, rounded to the nearest tenth) of the vehicle model.

TABLE II–PARAMETERS FOR THE PASSENGER AUTOMOBILE FUEL ECONOMY TARGETS

Model year	Parameters			
	a (mpg)	b (mpg)	c (gal/mi/ft^2)	d (gal/mi)
2011	31.20	24.00	51.41	1.91

(c) For model years 2012–2025, a manufacturer's passenger automobile fleet shall comply with the fleet average fuel economy level calculated for that model year according to Figure 2 and the appropriate values in Table III.

Figure 2:

$$CAFE_{required} = \frac{\sum_i PRODUCTION_i}{\sum_i \frac{PRODUCTION_i}{TARGET_i}}$$

Where:

*CAFE*_{required} is the fleet average fuel economy standard for a given fleet (domestic passenger automobiles or import passenger automobiles);

Subscript *i* is a designation of multiple groups of automobiles, where each group's designation, *i.e.*, *i* = 1, 2, 3, etc., represents automobiles that share a unique model type and footprint within the applicable fleet, either domestic passenger automobiles or import passenger automobiles;

*Production*_i is the number of passenger automobiles produced for sale in the United States within each *ith* designation, *i.e.*, which share the same model type and footprint;

*TARGET*_i is the fuel economy target in miles per gallon (mpg) applicable to the footprint of passenger automobiles within each *ith* designation, *i.e.*, which share the same model type and footprint, calculated according to Figure 3 and rounded to the nearest hundredth of a mpg, *i.e.*, 35.455 = 35.46 mpg, and the summations in the numerator and denominator are both performed over all models in the fleet in question.

Figure 3:

$$TARGET = \cfrac{1}{MIN\left[\,MAX\left(c \times FOOTPRINT + d, \dfrac{1}{a}\right), \dfrac{1}{b}\,\right]}$$

Where:

TARGET is the fuel economy target (in mpg) applicable to vehicles of a given footprint (*FOOTPRINT*, in square feet);

Parameters *a, b,c*, and *d* are defined in Table III; and

The *MIN* and *MAX* functions take the minimum and maximum, respectively, of the included values.

TABLE III–PARAMETERS FOR THE PASSENGER AUTOMOBILE FUEL ECONOMY TARGETS, MYS 2012–2025

Model year	Parameters			
	a (mpg)	*b* (mpg)	*c* (gal/mi/ft²)	*d* (gal/mi)
2012	35.95	27.95	0.0005308	0.006057
2013	36.80	28.46	0.0005308	0.005410
2014	37.75	29.03	0.0005308	0.004725
2015	39.24	29.90	0.0005308	0.003719
2016	41.09	30.96	0.0005308	0.002573
2017	43.61	32.65	0.0005131	0.001896
2018	45.21	33.84	0.0004954	0.001811
2019	46.87	35.07	0.0004783	0.001729
2020	48.74	36.47	0.0004603	0.001643
2021	50.83	38.02	0.0004419	0.001555
2022	53.21	39.79	0.0004227	0.001463
2023	55.71	41.64	0.0004043	0.001375
2024	58.32	43.58	0.0003867	0.001290
2025	61.07	45.61	0.0003699	0.001210

(d) In addition to the requirements of paragraphs (b) and (c) of this section, each manufacturer shall also meet the minimum fleet standard for domestically manufactured passenger automobiles expressed in Table IV:

TABLE IV—MINIMUM FUEL ECONOMY STANDARDS FOR DOMESTICALLY MANUFACTURED PASSENGER AUTOMOBILES, MYs 2011–2021

Model year	Minimum standard
2011	27.8
2012	30.7
2013	31.4
2014	32.1
2015	33.3
2016	34.7
2017	36.7
2018	38.0
2019	39.4
2020	40.9
2021	42.7
2022	44.7
2023	46.8
2024	49.0
2025	51.3

(e) For model years 2022–2025, each manufacturer shall comply with the standards set forth in paragraphs (c) and (d) in this section, if NHTSA determines in a rulemaking, initiated after January 1, 2017, and conducted in accordance with 49 U.S.C. 32902, that the standards in paragraphs (c) and (d) are the maximum feasible standards for model years 2022–2025. If, for any of those model years, NHTSA determines that the maximum feasible standard for passenger cars and the corresponding minimum standard for domestically manufactured passenger cars should be set at a different level, manufacturers shall comply with those different standards in lieu of the standards set forth for those model years in paragraphs (c) and (d), and NHTSA will revise this section to reflect the different standards.

(f) The following manufacturers shall comply with the standards indicated below for the specified model years:

(1) Avanti Motor Corporation.

AVERAGE FUEL ECONOMY STANDARD

Model year	Miles per gallon
1978	16.1
1979	14.5
1980	15.8
1981	18.2

AVERAGE FUEL ECONOMY STANDARD— Continued

Model year	Miles per gallon
1982	18.2
1983	16.9
1984	16.9
1985	16.9

(2) Rolls-Royce Motors, Inc.

Model year	Average fuel economy standard (miles per gallon)
1978	10.7
1979	10.8
1980	11.1
1981	10.7
1982	10.6
1983	9.9
1984	10.0
1985	10.0
1986	11.0
1987	11.2
1988	11.2
1989	11.2
1990	12.7
1991	12.7
1992	13.8
1993	13.8
1994	13.8
1995	14.6
1996	14.6
1997	15.1
1998	16.3
1999	16.3

(3) Checker Motors Corporation.

AVERAGE FUEL ECONOMY STANDARD

Model year	Miles per gallon
1978	17.6
1979	16.5
1980	18.5
1981	18.3
1982	18.4

(4) Aston Martin Lagonda, Inc.

AVERAGE FUEL ECONOMY STANDARD

Model year	Miles per gallon
1979	11.5
1980	12.1
1981	12.2
1982	12.2
1983	11.3
1984	11.3
1985	11.4

(5) Excalibur Automobile Corporation.

AVERAGE FUEL ECONOMY STANDARD

Model year	Miles per gallon
1978	11.5
1979	11.5
1980	16.2
1981	17.9
1982	17.9
1983	16.6
1984	16.6
1985	16.6

(6) Lotus Cars Ltd.

Model year	Average fuel economy standard (miles per gallon)
1994	24.2
1995	23.3

(7) Officine Alfieri Maserati, S.p.A.

AVERAGE FUEL ECONOMY STANDARD

Model year	Miles per gallon
1978	12.5
1979	12.5
1980	9.5
1984	17.9
1985	16.8

(8) Lamborghini of North America.

AVERAGE FUEL ECONOMY STANDARD

Model year	Miles per gallon
1983	13.7
1984	13.7

(9) LondonCoach Co., Inc.

AVERAGE FUEL ECONOMY STANDARD

Model year	Miles per gallon
1985	21.0
1986	21.0
1987	21.0

(10) Automobili Lamborghini S.p.A./Vector Aeromotive Corporation.

Model year	Average fuel economy standard (miles per gallon)
1995	12.8
1996	12.6
1997	12.5

(11) Dutcher Motors, Inc.

Model year	Average fuel economy standard (miles per gallon)
1986	16.0
1987	16.0
1988	16.0
1992	17.0
1993	17.0
1994	17.0
1995	17.0

(12) MedNet, Inc.

Model year	Average fuel economy standard (miles per gallon)
1996	17.0
1997	17.0
1998	17.0

(13) Vector Aeromotive Corporation.

Model year	Average fuel economy standard (miles per gallon)
1998	12.1

(14) Qvale Automotive Group Srl.

Model year	Average fuel economy standard (miles per gallon)
2000	22.0
2001	22.0

(15) Spyker Automobielen B.V.

AVERAGE FUEL ECONOMY STANDARD

Model year	Miles per gallon
2006	18.9
2007	18.9

[43 FR 28204, June 29, 1978]

EDITORIAL NOTE: For FEDERAL REGISTER citations affecting § 531.5 see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and at *www.fdsys.gov*.

§ 531.6 Measurement and calculation procedures.

(a) The fleet average fuel economy performance of all passenger automobiles that are manufactured by a manufacturer in a model year shall be determined in accordance with procedures established by the Administrator

of the Environmental Protection Agency under 49 U.S.C. 32904 and set forth in 40 CFR part 600. For model years 2017 to 2025, a manufacturer is eligible to increase the fuel economy performance of passenger cars in accordance with procedures established by EPA set forth in 40 CFR part 600, including any adjustments to fuel economy EPA allows, such as for fuel consumption improvements related to air conditioning efficiency and off-cycle technologies.

(b) The eligibility of a manufacturer to increase its fuel economy performance through use of an off-cycle technology requires an application request made to EPA in accordance with 40 CFR Part 86.1869–12 and an approval granted by EPA made in consultation with NHTSA. In order to expedite NHTSA's consultation with EPA, a manufacturer's application as part of the off-cycle credit approval process under 40 CFR 86.1869–12(b) or 40 CFR 86.1869–12(c) shall also be submitted to NHTSA at the same time if the manufacturer is seeking off-cycle fuel economy improvement values under the CAFE program for those technologies.

For off-cycle technologies which are covered under 40 CFR 86.1869–12(b) or 40 CFR 86.1869–12(c), NHTSA will consult with EPA regarding NHTSA's evaluation of the specific off-cycle technology to ensure its impact on fuel economy and the suitability of using the off-cycle technology to adjust the fuel economy performance. NHTSA will provide its views on the suitability of the technology for that purpose to EPA. NHTSA's evaluation and review will consider:

(1) Whether the technology has a direct impact upon improving fuel economy performance;

(2) Whether the technology is related to crash-avoidance technologies, safety critical systems or systems affecting safety-critical functions, or technologies designed for the purpose of reducing the frequency of vehicle crashes;

(3) Information from any assessments conducted by EPA related to the application, the technology and/or related technologies; and

(4) Any other relevant factors.

[77 FR 63191, Oct. 15, 2012]

APPENDIX TO PART 531—EXAMPLE OF CALCULATING COMPLIANCE UNDER § 531.5(c)

Assume a hypothetical manufacturer (Manufacturer X) produces a fleet of domestic passenger automobiles in MY 2012 as follows:

APPENDIX TABLE I

Model type				Description	Actual measured fuel economy (mpg)	Volume
Group	Carline name	Basic engine (L)	Trans-mission class			
1	PC A FWD	1.8	A5	2-door sedan	34.0	1,500
2	PC A FWD	1.8	M6	2-door sedan	34.6	2,000
3	PC A FWD	2.5	A6	4-door wagon	33.8	2,000
4	PC A AWD	1.8	A6	4-door wagon	34.4	1,000
5	PC A AWD	2.5	M6	2-door hatchback.	32.9	3,000
6	PC B RWD	2.5	A6	4-door wagon	32.2	8,000
7	PC B RWD	2.5	A7	4-door sedan	33.1	2,000
8	PC C AWD	3.2	A7	4-door sedan	30.6	5,000
9	PC C FWD	3.2	M6	2-door coupe	28.5	3,000
Total	27,500.					

Note to Appendix Table I: Manufacturer X's required fleet average fuel economy standard level would first be calculated by determining the fuel economy targets applicable to each unique model type and footprint combination for model type groups 1–9 as illustrated in Appendix Table II:

Manufacturer X calculates a fuel economy target standard for each unique model type and footprint combination.

APPENDIX TABLE II

Group	Model type Carline name	Basic engine (L)	Trans-mission class	Description	Base tire size	Wheelbase (inches)	Track width F&R average (inches)	Footprint (ft²)	Volume	Fuel economy target standard (mpg)
1	PC A FWD	1.8	A5	2-door sedan	205/75R14	99.8	61.2	42.4	1,500	35.01
2	PC A FWD	1.8	M6	2-door sedan	215/70R15	99.8	60.9	42.2	2,000	35.14
3	PC A FWD	2.5	A6	4-door wagon	215/70R15	100.0	60.9	42.3	2,000	35.08
4	PC A AWD	1.8	A6	4-door wagon	235/60R15	100.0	61.2	42.5	1,000	35.95
5	PC A AWD	2.5	M6	2-door hatchback	225/65R16	99.6	59.5	41.2	3,000	35.81
6	PC B RWD	2.5	A6	4-door wagon	265/55R18	109.2	66.8	50.7	8,000	30.33
7	PC B RWD	2.5	A7	4-door sedan	235/65R17	109.2	67.8	51.4	2,000	29.99
8	PC C AWD	3.2	A7	4-door sedan	265/55R18	111.3	67.8	52.4	5,000	29.52
9	PC C FWD	3.2	M6	2-door coupe	225/65R16	111.3	67.2	51.9	3,000	29.76
Total	27,500.									

Note to Appendix Table II: With the appropriate fuel economy targets determined for each unique model type and footprint combination, Manufacturer X's required fleet average fuel economy standard would be calculated as illustrated in Appendix Figure 1:

Appendix Figure 1—Calculation of Manufacturer X's fleet average fuel economy standard using Table II:

Fleet average fuel economy standard =

$$= \frac{(Manufacturer's\ Domestic\ Passenger\ Automobile\ Production\ for\ Applicable\ Model\ Year)}{\Sigma_i\left(\frac{Group_1\ Production}{Group_1\ Target\ Standard} + \frac{Group_2\ Production}{Group_2\ Target\ Standard} + \cdots \frac{Group_9\ Production}{Group_9\ Target\ Standard}\right)}$$

$$= \frac{(27,500)}{\left(\frac{1500}{35.01} + \frac{2000}{35.14} + \frac{2000}{35.08} + \frac{1000}{35.95} + \frac{3000}{35.81} + \frac{8000}{30.33} + \frac{2000}{29.99} + \frac{5000}{29.52} + \frac{3000}{29.79}\right)}$$

= 31.6 mpg

Appendix Figure 2—Calculation of Manufacturer X's actual fleet average fuel economy performance level using Table I:

Fleet average fuel economy performance =

$$= \frac{(Manufacturer's\ Domestic\ Passenger\ Automobile\ Production\ for\ Applicable\ Model\ Year)}{\Sigma_i\left(\frac{Group_1\ Production}{Group_1\ Performance} + \frac{Group_2\ Production}{Group_2\ Performance} + \cdots \frac{Group_9\ Production}{Group_9\ Performance}\right)}$$

$$= \frac{(27,500)}{\left(\frac{1500}{34.0} + \frac{2000}{34.6} + \frac{2000}{33.8} + \frac{1000}{34.4} + \frac{3000}{32.9} + \frac{8000}{32.2} + \frac{2000}{33.1} + \frac{5000}{30.6} + \frac{3000}{28.5}\right)}$$

= 32.0 mpg

Note to Appendix Figure 2: Since the actual fleet average fuel economy performance of Manufacturer X's fleet is 32.0 mpg, as compared to its required fleet fuel economy standard of 31.6 mpg, Manufacturer X complied with the CAFE standard for MY 2012 as set forth in § 531.5(c).

[77 FR 63191, Oct. 15, 2012]

PART 533—LIGHT TRUCK FUEL ECONOMY STANDARDS

AUTHORITY: 49 U.S.C. 32902; delegation of authority at 49 CFR 1.50.

§ 533.1 Scope.

This part establishes average fuel economy standards pursuant to section 502(b) of the Motor Vehicle Information and Cost Savings Act, as amended, for light trucks.

[42 FR 13807, Mar. 14, 1977, as amended at 43 FR 12013, Mar. 23, 1978]

§ 533.2 Purpose.

The purpose of this part is to increase the fuel economy of light trucks by establishing minimum levels of average fuel economy for those vehicles.

[42 FR 13807, Mar. 14, 1977, as amended at 43 FR 12013, Mar. 23, 1978]